

REMARKS

Favorable reconsideration of this application in light of the preceding amendments and the following remarks is requested.

Claim 1 having been cancelled and no claims having been added, the Applicants submit that claims 2-51 remain properly under consideration in this application.

The Applicants submit that the amendments to claim 2 above are supported by claims 1 and 2 as originally filed. The Applicants also contend that this amendment does not present any new matter or issue that would require additional searching in that claim 2, as originally filed, depended from and thus already encompassed the method recited in claim 1.

The Applicants further submit that the amendments above to those dependent claims that originally depended from claim 1 to depend from claim 2 simply reflects the cancellation of claim 1 and the incorporation of the subject matter of claim 1 into claim 2.

The Applicants again note that the present Action does not indicate that the drawings have been accepted by the Examiner. The Applicants request that the Examiner's next communication include an indication as to the acceptability of the filed drawings or as to any perceived deficiencies so that the Applicants may have a full and fair opportunity to submit appropriate amendments and/or corrections to the drawings.

The Applicants acknowledge that the application names joint inventors and contends that the subject matter disclosed and claimed herein was commonly owned at the time the inventions were made. Accordingly, while the Applicants acknowledge their

obligations under 37 C.F.R. § 1.56 regarding the accurate designation of inventorship, they contend that no correction or supplemental information is warranted at this time.

Rejections under 35 U.S.C. § 102

Claim 1 stands rejected under 35 U.S.C. § 102(b) as anticipated by Shimuzu et al.'s U.S. Patent No. 5,922,411 ("Shimuzu").

The Applicants submit that the cancellation of claim 1 reflect in the amendments to the claims presented above renders this rejection moot and request that it be reconsidered and withdrawn accordingly.

Rejections under 35 U.S.C. § 103

Claims 2-4, 7, 10-16, 21-27, 29, 30, 36-39, 41-46 and 48-51 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Shimuzu in view of Shibuya et al.'s U.S. Patent No. 5,614,271 ("Shibuya"). The Applicants traverse this rejection for the reasons detailed below.

The Applicants submit that one skilled in the art would understand Shimizu's "substrates" to be those used in final assembly rather than the semiconductor wafers on which circuits are being fabricated to form an integrated circuit. The Applicants contend that this focus is evident from Shimizu's disclosure with provides:

One of the preferred embodiments of the present invention involves a process for forming a ceramic film *as an insulating film or a protective film on a surface of each of various substrates or devices used in*

electronic products. In this case, as the process for forming the ceramic film, the afore-mentioned processes can be used.

Examples of the afore mentioned substrates may include those for semiconductor devices or liquid crystal devices. As the substrates for semiconductor devices, ***semiconductor-mounting substrates, printed-wiring boards or the like are exemplified.*** These substrates may be silicon plates, glass plates, alumina plates, plastic films or the like. As the elements used in the semiconductor device, semiconductor elements, capacitor elements, resistor elements or the like are exemplified. On the other hand, as the substrates for liquid crystal devices, display panels are exemplified. The display panels may be glass plates, silicon plates, plastic films or the like. As elements used in the liquid crystal devices, transparent electrode plates, pixel electrodes, color filters or the like are exemplified. ***In accordance with the present invention, the transformation of the polymer into the ceramic film can be carried out at a temperature as low as not more than 100° C.,*** so that the ceramic film can be formed on a surface of each of these substrates or elements without damage thereto.

Shimizu, col. 14, lines 5-23 (emphasis added). Accordingly, the Applicants contend that the referenced teachings of Shimizu are clearly not directed to the fabrication of semiconductor devices, but are instead directed to the protection of various final components arranged on a circuit board or other similar substrate. The Applicants contend that the requirements and intended purpose of such “passivation” or environmental protection layers is recognized in the art as distinct from the requirements and intended purpose of interlayer insulating layers formed during the fabrication of semiconductor devices. Accordingly, the Applicants submit that one skilled in the art would not be motivated to make the combination as proposed. Action at 2.

The Applicants further submit that Shibuya is directed to a method of forming a metallic oxide (SiO₂) film by:

- (a) coating the surface of the substrate with a coating solution containing a polysilazane having a weight-average molecular weight in the range from 1000 to 5000 as dissolved in an organic solvent to form a coating layer;

(b) drying the coating layer by heating according to a schedule comprising a stage of heating within a range of temperature from 80° C. to 140° C. for a length of time from 2 minutes to 5 minutes followed by a continuous or stepwise increase of the temperature to reach 240° C. taking 2 minutes to 5 minutes and a stage of heating within a range of temperature from **240° C. to 350° C.** for a length of time from 2 minutes to 5 minutes;

(c) irradiating the thus dried coating layer at a temperature in the range from **240° C. to 350° C.** with ultraviolet light for 0.5 minute to 3 minutes; and

(d) subjecting the coating layer after the ultraviolet irradiation to a **baking treatment** for 15 minutes to 90 minutes.

Shibuya, col. 3, lines 8-25 (emphasis added). According to Shibuya, with regard to the irradiation step (c):

It is *essential in the inventive method* that the **ultraviolet irradiation treatment** of the coating layer is performed **at a temperature in the range from 240° to 350° C.** The coating layer of the polysilazane is converted into a silica-based coating film by the reaction with **ozone generated by the ultraviolet irradiation.**

Shibuya, col. 4, lines 58-63 (emphasis added), and that the baking treatment of step (d) involves subjecting the coating layer, which was previously irradiated with UV light while maintained at a temperature within a range of 240-350° C.:

... to a baking treatment in a baking furnace at a temperature in the range from **350° to 800° C.** for a length of time in the range from 15 to 90 minutes **to complete conversion of the polysilazane into silica.** When a wiring layer of a metal such as aluminum is provided between the substrate surface and the coating film of the polysilazane, **the baking temperature should be in the range from 350° to 450° C.** in consideration of the low heat resistance of the metal while the baking temperature can be high enough in the range **from 450° to 800° C. when such a metallic wiring layer is not provided.**

Shibuya, col. 4, line 65 to col. 5, line 8 (emphasis added).

Accordingly, the Applicants maintain that Shibuya *explicitly requires* the “*essential*” application of UV radiation while maintaining a film temperature of *at least*

240° C. to generate the ozone from within the SOG layer. The Applicants submit, therefore, that Shibuya cannot be fairly characterized as teaching or suggesting to one skilled in the art that an *external* oxidant could be applied to “treat” the SOG layer. Action at 3. Indeed, in this instance, the Applicants contend Shibuya’s teachings correspond more closely with Shimizu’s first embodiment in which a silazane-based polymer *and* a ceramic-transformation promoting agent (“CPA”) *are combined* in the composition as applied to the body, which could subsequently be exposed to steam to initiate the conversion of the polymer by the CPA. Shimizu, col. 2, lines 47-59.

The Applicants maintain that one of ordinary skill in the *semiconductor* manufacturing arts would be aware that polysilazane SOG layers could be safely processed at temperatures sufficient to convert the polysilazane to silicon dioxide without an additional wet process. The Applicants also maintain that one of ordinary skill in the semiconductor arts would not be motivated to add a new “wet” process to Shibuya’s process which was disclosed as capable of generating a “very dense silica-based coating film,” Shibuya, col. 5, line 14.

The Applicants submit that one of ordinary skill in the semiconductor fabrication arts would have to recognize some distinct advantage or efficiency with respect to a process modification before there would be any motivation to make such a modification. In this instance, there is no indication that Shibuya’s coating film is in any way deficient or that Shimizu’s film would present any improvement in the film properties. Further, one skilled in the art would appreciate that incorporating Shimizu’s wet process would complicate the fabrication process and require additional wet process stations and additional drying stations. Accordingly, the Applicants contend that no reasonable basis

has been established to support the contention that one skilled in the art would have been motivated to make the proposed combination or, in light of the different arts to which the references are directed, that such a combination would have been made with any reasonable expectation of success.

Similarly, the Applicants contend that one of ordinary skill with depositing films on transparent resin materials for use with LCD displays would not seek guidance from a reference directed to semiconductor device fabrication which defines as “essential” processing temperatures well above the highest temperature that can reasonably be endured by the resin material.

Further with regard to Shibuya’s “teaching” regarding ozone, Action at 3, the Applicants maintain that according to Shibuya, it was the subsequent baking process at a temperature of at least 350° C. that was required to “convert the polysilazane film to a silica-based coating film.” Shibuya, col. 5, lines 62-63. The Applicants contend that Shibuya’s disclosure in this regard is more fairly read as “teaching away” from using ozone as an oxidant in the absence of a subsequent baking process at more elevated temperatures.

With respect to Shibuya’s “teaching” regarding the use of a mixture of oxygen and water vapor as the oxidants, Action at 3, the Applicants note that absent the UV irradiation, the use of such oxidants even at 250° C. was deemed to result in an “incomplete conversion of the coating layer of polysilazane into a silica-based coating film.” Shibuya, col. 6, lines 53-54. Once again the Applicants maintain that Shibuya’s disclosure in this regard is more fairly read as “teaching away” from the use of such oxidants in the manner suggested.

The Applicants, therefore, contend that when the teachings of the references are properly considered as a whole, MPEP § 2141.02, the fundamental differences in the substrates and the corresponding effect on the processing steps and the operable and “essential” temperature ranges provided in the references would be sufficient to prevent one of ordinary skill from selectively combining the disparate process steps in the manner suggested.

Further, the Applicants suggest that no teaching or suggestion has been identified in the applied references with regard to densifying the SOG layer prior to treatment with an oxidant solution, *e.g.*, claim 13, increasing the HF etch resistance of the SOG layer by at least 50%, *e.g.*, claim 14, or partially oxidizing the polysilazane in the SOG layer prior to treatment with an oxidant solution, *e.g.*, claims 15 and 36.

The Applicants also contend that the applied references, whether singly or in combination, fail to teach or suggest the particular embodiment of the invention recited in claim 36 wherein the SOG layer is first baked to achieve a partial conversion of the polysilazane to silicon dioxide and only then treated with an oxidant solution to convert the remaining polysilazane and complete the formation of the silicon dioxide layer.

The Applicants maintain, therefore, that no sufficient logical or technical basis has been established to provide reasonable support for the proposition that one skilled in the art would have been motivated to make the proposed combination. The Applicants maintain that the allegation of “obviousness” must be supported by “reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references.” *Ex parte Clapp*, 227 USPQ 972, 973 (B.P.A.I. 1985).

The Applicants note the suggestion that the various materials, parameters and ranges recited in certain of the dependent claims are “variables of the art which one of ordinary skill in the art would have been able to determine.” Action at 4. The Applicants submit that while one or more of these materials, parameters and ranges may be taught or encompassed by prior art, the failure of basic combination of references to teach the claimed method would leave one skilled in the art with no method on which experimentation and optimization could be performed. Absent this basic teaching, the Applicants maintain that no “result-effective variables” for the claimed process can fairly said to have been identified, or even identifiable, from which one skilled in the art would undertake to determine optimum or workable ranges of such variables. *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977)

The Applicants request, therefore, that the present rejections be reconsidered and withdrawn accordingly.

Allowable Subject Matter

The Applicants again note with appreciation the Examiner’s indication that claims 5, 6, 8, 9, 17-20, 28, 31-33, 40 and 47 remain objected to as depending from a rejected base claim and would, therefore, be allowable if rewritten in independent form incorporating limitations of all included claims. As reflected by the remarks above, however, the Applicants contend that the claims objected to and various of the claims from which they depend are allowable in their present form and that no such rewriting of the claims is warranted by this record.

Allowed Claims

The Applicants again note with appreciation the Examiner's indication that claims 34 and 35 are allowed.

CONCLUSION

In view of the remarks presented above, the Applicants submit that each of the pending objections and rejections have been addressed and overcome, leaving each of the claims of the present application in condition for allowance. A notice to that effect is requested.

If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to contact the undersigned.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge any underpayment or non-payment of any fees required under 37 C.F.R. §§ 1.16 or 1.17, or credit any overpayment of such fees, to Deposit Account No. 08-0750, including, in particular, extension of time fees.

Respectfully submitted,

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